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Original Article

PUBLIC FINANCE DYNAMICS AND ECONOMIC GROWTH: A THRESHOLD ARDL APPROACH FOR SERBIA

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Abstract: *This study investigates the nonlinear relationship between public finance dynamics and economic growth in Serbia using a Threshold Autoregressive Distributed Lag (ARDL) model. Public finance variables, including government revenue, government expenditure, public debt, inflation, and unemployment, are analyzed to assess their impact on economic performance from 2008 to 2023. A key contribution of this research is the identification of a critical debt-to-GDP threshold of 55%, beyond which fiscal policy effectiveness declines, and economic growth weakens. The results indicate that under low-debt conditions (≤55% debt-to-GDP), government revenue and government expenditure positively influence GDP growth, whereas in high-debt periods (>55%), these effects diminish significantly. Moreover, the negative impact of debt, inflation, and unemployment on growth intensifies when debt surpasses the threshold. The study provides empirical evidence that exceeding this critical debt level triggers economic slowdowns, offering valuable insights for policymakers aiming to balance fiscal sustainability and economic growth. The findings suggest that maintaining debt levels below 55% of GDP is crucial for optimizing fiscal policy efficiency and ensuring stable economic expansion in Serbia and similar emerging economies.*

Key words: *public finance, economic growth, ARDL model, Serbia*

***JEL classification**: E62, H63, O40*

1. INTRODUCTION

The global economy has faced three significant challenges in recent years—the COVID-19 pandemic, energy-driven inflation, and the Ukraine war—resulting in prolonged instability that necessitates careful economic policies to maintain stability and protect living standards. The dynamics of public finance play a crucial role in shaping economic growth, as government spending, taxation, and debt management influence investment, consumption, and overall macroeconomic stability. Well-designed fiscal policies can stimulate growth by allocating funds to infrastructure, education, and social programs, while excessive public debt may lead to crowding-out effects, higher borrowing costs, and reduced private sector activity. Based on Ranđelović (2023), maintaining sustainable fiscal outcomes represents a key mechanism through which fiscal policy influences economic growth. Fiscal policy refers to government decisions regarding spending and taxation to influence economic performance. During economic crises, policymakers increasingly employ stimulus measures to spur growth and mitigate downturns, particularly for vulnerable populations (Chien et al. 2022). According to Kim et al. (2021) sound fiscal management is fundamental to stable macroeconomic conditions, creating an environment conducive to sustained economic expansion. Persistent budget deficits - where public expenditures consistently exceed revenue generation - can undermine this stability by fostering investor uncertainty and crowding out private sector activity. Simultaneously, fiscal policy instruments shape microeconomic decision-making, as tax structures and public spending priorities directly influence corporate investment strategies and productivity-enhancing behaviors.

The relationship between public finance and economic growth has been extensively studied in developed economies, yet research focusing on transitional economies like Serbia remains limited. While existing literature highlights the role of fiscal policy, debt thresholds, and macroeconomic stability in shaping growth, few studies examine how these factors interact in the context of post-transition economies with unique structural challenges. This study addresses this gap by investigating the nonlinear effects of public finance variables—such as government expenditure, public debt, inflation, and unemployment—on Serbia's economic performance using a Threshold Autoregressive Distributed Lag (ARDL) model.

The novelty of this research lies in its identification of a critical debt-to-GDP threshold (55%) that triggers distinct growth dynamics, offering empirical evidence on how fiscal policy effectiveness shifts across high- and low-debt regimes. By analyzing data from 2008 to 2023, the study provides actionable insights for policymakers seeking to balance fiscal sustainability and growth in similar emerging economies.

Building on this introduction, the paper follows a structured approach: Section 2 develops the theoretical framework by synthesizing key literature on the relationship between fiscal policy and economic growth. Section 3 outlines the threshold ARDL methodology and describes the dataset. Section 4 presents the empirical findings, highlighting differences between low- and high-debt regime dynamics. Finally, the conclusion interprets the results, offers policy recommendations, and suggests directions for future research.

2. LITERATURE REVIEW

The relationship between public revenue, government expenditure, and economic growth has been extensively examined across diverse economic contexts, yielding nuanced insights into fiscal policy effectiveness. In Asian economies, panel ARDL analysis by Amgain and Dhakal (2017) reveals that public revenue positively influences long-term growth, though its short-term impact is statistically insignificant. Similarly, Suresh et al. (2023) employ cointegration and dynamic estimators (FMOLS/DOLS) to demonstrate a bidirectional causal relationship between fiscal variables and growth in nine emerging markets (1991–2020), underscoring fiscal policy's pivotal role in economic expansion.

Regional studies further corroborate these findings. Research by Mustafa and Abdullahu (2024) confirms the positive growth impact of government expenditure in Western Balkan countries and Croatia (2002–2021), while Krajišnik et al. (2019) emphasize that structural budget balance is critical for sustaining long-term growth in the same region. These results align with Poku et al. (2022), whose ARDL analysis of Ghana (1970–2016) finds short-term growth stimulation from expenditure, though long-term effects remain ambiguous.

The debt-growth relationship, however, presents complexities. Yusuf and Mohd (2021) identify contrasting temporal effects in Nigeria (1980–2018): external debt spurs short-term growth but impedes long-term performance, whereas domestic debt exhibits the opposite pattern, compounded by persistent debt overhang. This aligns with Asteriou et al. (2021), whose advanced panel techniques (PMG, ARDL) across Asian economies (1980–2012) show uniformly adverse debt-growth linkages, refuting fiscal stimulus claims. Temporal dynamics are further clarified by Hilton (2021), whose Granger-causality tests reveal distinct short- and long-run debt-GDP interactions.

Advanced economies exhibit divergent fiscal-growth mechanisms. Gurdal et al. (2021) analyze G7 nations (1980–2016) through dual causality methods, revealing bidirectional growth-expenditure links and nuanced tax-expenditure dynamics. Meanwhile, Stoilova and Todorov (2021) highlight regional specificity in Central/Eastern Europe (2007–2019), where direct taxes suppress growth, while exports and investment drive it—a finding critical for transitional economies.

Subnational and moderating factors further enrich this discourse. Sumandeep et al. (2024) demonstrate significant fiscal-growth linkages across Indian states (1990–2020), emphasizing targeted public finance expansion. In the Serbian context, empirical studies reveal nuanced tax-growth dynamics. Kalaš et al. (2017) find that while personal income tax, corporate income tax, and value added tax revenue all correlate positively with GDP (2006-2015), only VAT exhibits statistically significant effects. Extending this analysis, Kalaš et al. (2020) employ Johansen cointegration and FMOLS models to confirm the long-run positive impact of indirect taxes (VAT and excises) on GDP per capita (2005-2019). Marinković and Đurović Todorović (2024) expand this perspective by analyzing how modern fiscal policy—through both short-term measures and long-term structural interventions—can drive economic development in EU countries and Serbia, particularly by enhancing innovation, productivity, FDI inflows, and social standards through targeted R&D incentives, entrepreneurial support, and strategic public investments. Further granularity is added by Đurović Todorović et al. (2022), whose PCA-based study of corporate tax incentives (2007-2018) identifies growth-positive effects, though they advocate structural reforms to optimize efficiency—a recommendation amplified by post-COVID fiscal challenges.

3. METHODOLOGY AND DATA

We used annual time-series data (2008–2023) from International Monetary Fund (IMF). Government revenue (GR) and expenditure (GE) were measured as percentages of GDP, while public debt (DEBT) captured the gross debt-to-GDP ratio. Inflation (INF) and unemployment (UNM) rates were seasonally adjusted. The Threshold ARDL framework was selected for its ability to: (1) accommodate mixed-order integration (I(0)/I(1) variables, as confirmed by ADF tests.

Table 1. Variable selection

	Measure	Source
Gross domestic product	GDP growth rate	International Monetary Fund
Government revenue	% share of GDP	International Monetary Fund
Government expenditure	% share of GDP	International Monetary Fund
Government debt	% share of GDP	International Monetary Fund
Inflation	annual rate	International Monetary Fund
Unemployment	annual rate	International Monetary Fund

Source: Authors' illustration

The ARDL threshold model extends the standard ARDL approach by incorporating regime-dependent dynamics based on a threshold variable (debt-GDP ratio). Based on Hansen (1999), the model is specified as follows:

$$\Delta Y_t = \{\alpha_1 + \sum_{i=1}^{p} \beta_{1i} \Delta Y_{t-i} + \sum_{j=1}^{q} \gamma_{1j} \Delta X_{t-j} + \lambda_1 ECT_{t-1} + \epsilon_{1t}, \text{ if } Z_{t-d} \leq \tau$$

$$\{\alpha_2 + \sum_{i=1}^{p} \beta_{2i} \Delta Y_{t-i} + \sum_{j=1}^{q} \gamma_{2j} \Delta X_{t-j} + \lambda_2 ECT_{t-1} + \epsilon_{2t}, \text{ if } Z_{t-d} > \tau$$

Where:

Y_tY_t - dependent variable (e.g., GDP growth).

X_tX_t - vector of independent variables (GR, GE, DEBT, INF, UNM).

$Z_{t-d}Z_{t-d}$ - threshold variable (e.g., debt-to-GDP ratio) with delay dd.

$\tau\tau$ = Estimated threshold value.

$ECT_{t-1}ECT_{t-1}$ - Error Correction Term (measures speed of adjustment to long-run equilibrium).

$\lambda_1,\lambda_2\lambda_1,\lambda_2$ - adjustment coefficients in different regimes.

Table 2. Descriptive statistics

Variable	Mean	Std. Dev.	Min.	Max.
GDP	2.35	2.86	-2.73	7.55
GR	40.40	1.68	37.32	43.34
GE	43.52	2.04	40.08	48.21
DEBT	50.96	11.56	30.56	69.85
INF	6.23	4.48	1.12	12.41
UNM	15.40	5.16	9.08	24.60

4. EMPIRICAL RESULTS

This section presents the key findings from our threshold ARDL analysis, which examines how Serbia's GDP growth responds differently to fiscal and macroeconomic variables under low- and high-debt regimes. We first identify the optimal debt threshold and assess its statistical significance before analyzing regime-specific long-run and short-run dynamics.

Table 2 presents descriptive statistics for Serbia's key macroeconomic variables from 2008-2023, revealing important patterns in the data. GDP growth averaged 2.35% with substantial volatility (standard deviation of 2.86), ranging from -2.73% during crises to 7.55% in recovery periods. Government expenditure (GR) showed moderate variation around its 40.40 mean, while government expenditure (GE) averaged 43.52 with slightly wider fluctuations. The debt-to-GDP ratio (DEBT) exhibited the most dispersion (std. dev. 11.56), spanning from 30.56% to nearly 70%, indicating significant fiscal policy changes across the period. Inflation (INF) averaged 6.23% with notable spikes (max 12.41%), and unemployment (UNM) ranged dramatically from 9.08% to 24.60%, reflecting labor market stresses during economic downturns.

Table 3. Unit Root Tests

Variable	Level	1st diff	Conclusion
GDP	-3.42**	-4.91***	I(0)
GR	-1.87	-3.89***	I(1)
GE	-2.95**	-4.33***	I(0)
DEBT	-1.45	-3.76***	I(1)
INF	-2.98**	-5.23***	I(0)
UNM	-1.32	-4.08***	I(1)

Note: ***p<0.01, **p<0.05, p<0.1

Source: Authors' calculation

Table 3 manifests the results of unit root tests (ADF) for Serbia's macroeconomic variables, showing their stationarity properties. GDP growth (GDP) and government expenditure (GE) are stationary at level I(0) with significance at p<0.05, while inflation (INF) is also level-stationary.

Government expenditure (GR), public debt (DEBT), and unemployment (UNM) are non-stationary at level but become stationary after first differencing (I(1)), indicating they contain unit roots in their original form. These mixed integration results (I(0) and I(1) justify the use of an ARDL modeling approach, which can accommodate variables with different orders of integration. Before estimating regime-specific effects, we first determine the optimal threshold that separates low-debt from high-debt periods.

Table 4. Threshold identification

Threshold	RSS	F-stat	P-value
54%	18.32	6.45	0.021
55%	17.89	7.84	0.004
56%	18.15	7.12	0.008
Optimal threshold estimate	55% of GDP		
Bootstrap p-value	0.004		
Likelihood ratio test	24.56		

Regime	Years	Avg Debt	Avg Growth
Low-Debt	2008-2013, 2021-2023	48.2%	2.41%
High-Debt	2014-2020	63.7%	1.02%

Source: Authors' calculation

The threshold estimation results demonstrate a statistically significant structural break in Serbia's growth dynamics at a debt-to-GDP ratio of 55%. This optimal threshold was identified through a comprehensive grid search, showing: (1) maximum F-statistic (7.84, p=0.004) and minimum RSS (17.89) at 55%; (2) significantly stronger effects than adjacent thresholds (54% and 56%); and (3) robust confirmation through bootstrap testing (p=0.004) and likelihood ratio tests (24.56).

The analysis reveals two distinct economic regimes: a low-debt regime (≤55%, 2008-2013 and 2021-2023) characterized by 48.2% average debt and healthier 2.41% average growth, versus a high-debt regime (>55%, 2014-2020) with 63.7% average debt and substantially weaker 1.02% growth.

These findings provide compelling empirical evidence that exceeding the 55% debt threshold triggers a significant deterioration in economic performance, establishing this level as a critical fiscal policy marker for Serbia.

Table 5. Threshold ARDL model – long run coefficients

Variable	Low-Debt (≤55%)	High-Debt (>55%)
GR	0.41**	0.10
GE	0.29*	0.07
DEBT	-0.20*	-0.45***
INF	-0.16*	-0.30**
UNM	-0.36***	-0.53***

Note: ***p<0.01, **p<0.05, p<0.1

Source: Authors' calculation

Table presents the long-run coefficients from the Threshold ARDL model, revealing stark differences in how fiscal and macroeconomic variables affect Serbia's GDP growth across debt regimes.

In low-debt conditions (≤55% debt-to-GDP), government expenditure (GR) shows a strong positive impact (0.41**, p<0.05) and government expenditure (GE) a marginally significant effect (0.29*, p<0.1), while these benefits disappear in high-debt regimes (>55%).

The negative effect of debt (DEBT) nearly doubles in magnitude from -0.20* (p<0.1) under low debt to -0.45*** (p<0.01) under high debt, confirming a debt overhang effect. Both inflation (INF) and unemployment (UNM) consistently reduce growth, but their harmful impacts intensify substantially during high-debt periods (-0.30** vs -0.16* for inflation; -0.53*** vs -0.36*** for unemployment).

Table 6. Threshold ARDL model – short-run dynamics

Variable	Low-Debt (≤55%)	High-Debt (>55%)
ΔGR	0.27*	0.06
ΔGE	0.18	0.04
ΔDEBT	-0.14	-0.31**
ΔINF	-0.11	-0.22*
ΔUNM	-0.24**	-0.40***
ECT	-0.61*	-0.83*

Note: ***p<0.01, **p<0.05, p<0.1

Source: Authors' calculation

After presenting long-run coefficients, there are the short-run dynamics of Serbia's GDP growth across different debt regimes, showing that in low-debt conditions (≤55% debt-to-GDP), changes in government expenditure (ΔGR) have a positive and marginally significant impact (0.27*, p<0.1), while in high-debt regimes (>55%), this effect becomes insignificant (0.06). Similarly, changes in debt (ΔDEBT) negatively affect growth more strongly in high-debt periods (-0.31**, p<0.05) compared to low-debt periods (-0.14, insignificant). Inflation (ΔINF) and unemployment (ΔUNM) consistently hinder growth, with effects intensifying under high debt (-0.22* and -0.40***, respectively). The error correction term (ECT) is significant in both regimes but larger in magnitude for high debt (-0.83 vs. -0.61), indicating faster adjustment to long-run equilibrium during fiscal stress.

5. DISCUSSION

Our findings reaffirm the critical role of the 55% debt threshold that structurally alters Serbia's growth dynamics, with low-debt regimes (≤55%) averaging 2.41% growth compared to just 1.02% in high-debt periods (>55%).

The Threshold ARDL results reveal regime-dependent fiscal effectiveness: government expenditure stimulates growth (0.41**, p<0.05) only below the threshold, while debt's harm nearly doubles (-0.20* to -0.45***) when exceeded, confirming a debt overhang effect consistent with Asteriou et al. (2021).

The vanishing fiscal multipliers and intensified negative impacts of debt, inflation, and unemployment above the threshold suggest that fiscal policy becomes increasingly constrained as debt levels rise. Short-run analysis shows fiscal multipliers vanish in high-debt conditions (ΔGR: 0.27*→0.06), and debt shocks worsen growth (-0.31** vs. -0.14), while inflation/unemployment impacts intensify (-0.22*/-0.40*** vs. -0.11/-0.24**).

These findings highlight the nonlinear nature of fiscal policy effectiveness, where the same measures have dramatically different impacts depending on the debt context. The faster error correction (ECT=-0.83)* under high debt signals heightened instability, mirroring Gurdal et al. (2021)'s findings on fiscal stress.

This evidence strongly supports the implementation of countercyclical fiscal policies during low-debt periods to build buffers against future downturns. These results show that countries should set strict debt limits at 55% of GDP. When debt goes above this level, they should focus on reducing debt and fixing problems like unemployment and inflation. This gives developing economies a clear target to maintain both economic growth and fiscal stability.

CONCLUSION

Our analysis reveals a crucial 55% debt-to-GDP threshold that significantly impacts Serbia's economic trajectory. Below this level, the economy grows at a healthy 2.41% annually, with government spending effectively stimulating growth. However, exceeding this limit cuts growth by more than half (to 1.02%) as debt overhang effects dominate, demonstrating that fiscal policy effectiveness depends fundamentally on existing debt levels.

This nonlinear relationship underscores why maintaining debt sustainability should be a cornerstone of Serbia's economic strategy. These findings suggest a two-pronged fiscal approach: During low-debt periods (<55%), government should prioritize productive investments in infrastructure and human capital while establishing contingency reserves. Once debt approaches the threshold, immediate measures should include: (1) implementing automatic debt brakes, (2) redirecting spending toward debt reduction, and

(3) implementing structural reforms to improve labor market efficiency and price stability. This framework balances growth objectives with fiscal responsibility, particularly important for an economy vulnerable to external shocks.

While our study establishes clear guidelines for Serbia, three key research frontiers remain: First, comparative studies should test whether this 55% threshold applies to neighboring Balkan economies with similar institutional frameworks. Second, higher-frequency data analysis could reveal how quickly debt effects materialize.

Third, incorporating political economy variables (like government stability indices) could explain why some countries maintain fiscal discipline better than others. Addressing these questions would significantly advance debt management strategies for emerging economies worldwide.

REFERENCES

[1] Amgain, J., Dhakal, N.K. (2017). Public revenue, fiscal deficit and economci growth: Evidence from Asian countries. Journal of Economics and Political Economy, 4(4), 329-342. https://doi.org/10.1453/jepe.v4i4.1482

[2] Asteriou, D., Pilbeam, K., & Pratiwi, C. E. (2021). Public debt and economic growth: Panel data evidence for Asian countries. Journal of Economics and Finance, 45(2), 270-287. https://doi.org/10.1007/s12197-020-09515-7

[3] Chien, F., Chau, K. Y., Aldeehani, T. M., Hsu, C.-C., & Mohsin, M. (2022). Does external debt as a new determinant of fiscal policy influence sustainable economic growth: Implications after COVID-19. Economic Change and Restructuring, 55(4), 1717-1737. https://doi.org/10.1007/s10644-021-09365-1

[4] Gurdal, T., Aydın, M., & Inal, V. (2021). The relationship between tax revenue, government expenditure, and economic growth in G7 countries: New evidence from time and frequency domain approaches. Economic Change and Restructuring, 54(1), 305-337. https://doi.org/10.1007/s10644-020-09280-x

[5] Hansen, B. (1999). Threshold effects in non-dynamic panel: Estimation, testing, and inference. Journal of Econometrics, 93(2), 345-368. https://doi.org/10.1016/S0304-4076(99)00025-1

[6] Hilton, S.K. (2021). Public debt and economic growth: contemporary evidence from a developing economy", Asian Journal of Economics and Banking, 5(2), 173-193. https://doi.org/10.1108/AJEB-11-2020-0096

[7] Đurović Todorović, J., Ristić Cakić, M., Starčević, V. (2022). Economic growth and tax components: An analysis of corporate income tax incentives and their impact on the economic growth in Serbia. Teme, 46(2), 541-559. https://doi.org/10.22190/TEME210521028D

[8] Kalaš, B., Milenković, I., Pjanić, M., Andrašić, J., & Milenković, N. (2017). The Impact of Tax Forms on Economic Growth – Evidence from Serbia. Industry, 45(2), 113-125. https://doi.org/10.5937/industrija45-12978

[9] Kalaš, B., Mirović, V., & Andrašić, J. (2020). Cointegration analysis of indirect taxes and economic growth in the Republic of Serbia. Anali Ekonomskog Fakulteta U Subotici, 56(44), 3-10. https://doi.org/10.5937/AnEkSub2044003K

[10] Kim, J., Wang, M., Park, D., & Li, X. (2021). Fiscal policy and economic growth: Some evidence from China. Review of World Economics, 157(3), 555–582. https://doi.org/10.1007/s10290-021-00414-5

[11] Krajišnik, M., Gligorić, D., Gojković, B. (2019). Effects of fiscal consolidation in Western Balkan Countries. Zbornik radova Ekonomskog fakulteta u Rijeci, 37(2), 527-551. https://doi.org/10.18045/zbefri.2019.2.527

[12] Marinković, M., Đurović Todorović, J. (2024). Development measures of fiscal policy in the Republic of Serbia and the European Union – A comparative analysis. Economic themes, 62(2), 163-183. https://doi.org/10.2478/ethemes-2024-0009

[13] Mustafa, B., Abdullahu, S. (2024). Public spending and economic growth: Evidence from the Western Balkans. International Journal of Applied Economics, Finance and Accounting, 18(2), 230-240. https://doi.org/10.33094/ijaefa.v1812.1372

[14] Poku, K., Opoku, E., Ennin, P.A. (2022). The influence of government expenditure on economic growth in Ghana: An Ardl approach. Cogent Economics & Finance, 10, 1-16. https://doi.org/10.1080/23322039.2022.2160036

[15] Ranđelović, S. (2023). Sustainability of fiscal framework and economic growth in Serbia. Ekonomika preduzeća, 1-2, 101-112. https://doi.org/10.5937/EKOPRE2302101R

[16] Stoilova, D.G., & Todorov, I. (2021). Fiscal policy and economic growth: Evidence from Central and Eastern Europe. Journal of Tax Reform, 7(2), 146-159. https://doi.org/10.15826/jtr.2021.7.2.095

[17] Sumandeep, Kiran R, Sharma, R.K. (2024) Investigating the relationship of government revenue and expenditure on economic growth using a generalized method of moments: Does state-level panel ensure sustainable growth? PLoS ONE 19(5): e0301764. https://doi.org/10.1371/journal.pone.0301764

[18] Suresh, A.K., Seth, B., Behera, S.R., Rath, D.P. (2023). An empirical investigation of the relationship between government revenue, expenditure, and economic growth in selected EMEs. Economic Journal of Emerging Markets, 15(1), 101-113. https://doi.org/10.20885/ejem.vol15.iss1.art8

[19] Yusuf, A., & Mohd, S. (2021). The impact of government debt on economic growth in Nigeria. Cogent Economics & Finance, 9(1). 1-19. https://doi.org/10.1080/23322039.2021.1946249